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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/616,457	07/09/2003	Manfred Herrmann	GP-301716	1034

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CARY W. BROOKS  
General Motors Corporation  
Mail Code 482-C23-B21  
P.O. Box 300  
Detroit, MI 48265-3000

EXAMINER
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ONEILL, KARIE AMBER

ART UNIT	PAPER NUMBER
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1746

DATE MAILED: 03/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	<b>Application No.</b> 10/616,457	<b>Applicant(s)</b> HERRMANN, MANFRED	
	<b>Examiner</b> Karie O'Neill	<b>Art Unit</b> 1746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 09 July 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-45 is/are pending in the application.
- 4a) Of the above claim(s) 34-45 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-33 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Election/Restrictions***

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-33, drawn to a method for the investigation of a fuel cell system, classified in class 429, subclass 13.
- II. Claims 34-45, drawn to an apparatus for the investigation of a fuel cell system, classified in class 429, subclass 13.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another and materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the process of investigation can be carried out with the use of several different apparatus, not just the one being claimed by the inventor.

Because these inventions are independent or distinct for the reasons given above and the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper.

Art Unit: 1746

During a telephone conversation with Cary Brooks on February 13, 2006, a provisional election was made with traverse to prosecute the invention of Group I, claims 1-33.

Affirmation of this election must be made by applicant in replying to this Office Action. Claims 34-45 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-33 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: developing an association between a predetermined electrical power output and the actual power output to determine if there is leakage in the fuel cell, heating the fuel cell to an operating temperature and maximum temperature to measure the temperature of a fuel cell in normal operation and the actual heat output to determine if there is leakage occurring in the fuel cell, and/or closing off valves to measure the pressure within the fuel cell and its possible changes due to leakage.

Claim 3 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards

Art Unit: 1746

as the invention. It is unclear what "having at least substantially 95% N<sub>2</sub> and 5% H<sub>2</sub>" means.

Does applicant allow for any other gases besides N<sub>2</sub> and H<sub>2</sub> in the mixture?

Claims 26-29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear what is meant by "a different manner of operation is consciously selected" and "said mixture if effected" and "intended quantity of fuel".

Claims 30-32 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear what is meant by "renewed test".

Applicant's cooperation is respectfully requested in ensuring that the method claims distinctly point out applicant's invention, i.e. distinctly reciting actual method steps.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Art Unit: 1746

Claims 1-2, 4-5, and 10-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Bette (US 6,156,447).

Bette discloses in Figure 1, a method for identifying a gas leak between the anode and cathode gas areas and in the membrane electrode unit (column 4 lines 18-21) of a fuel cell system, said fuel cell system having an anode side to which a fuel is supplied in operation (4) and a cathode side to which an oxidizing agent is supplied in operation (6) and comprising at least one fuel cell (2), each fuel cell having an anode (4), a cathode (6) and a membrane (8) separating the cathode from the anode, said method being adapted to carry out one of the following tests: a) to test whether said fuel cell system is gas-tight at said anode side and/or at said cathode side; b) to test whether a leakage is present between said anode side and said cathode side, each test being carried out with a mixture of at least one inert gas (column 4 lines 18-26) with at least fuel permissible for the operation of said fuel cell system, and said mixture being supplied to said anode side of the fuel cell system (column 4 lines 42-48), wherein nitrogen is selected for said inert gas and hydrogen for said fuel. He discloses the method being carried out in an environment with a normal air atmosphere and normal ventilation (column 1 lines 44-49) and a plurality of fuel cells being combined together to form said fuel cell system in the form of a fuel cell stack and at least one of the tests is carried out at the fuel cell stack (column 5 lines 11-13). Bette discloses a fuel cell system comprising at least first and second inlets (10 and 18) and at least first and second outlets (14 and 22) wherein, during carrying out the test, said mixture is filled at a predetermined test pressure into the fuel cell system through one of said inlets and outlets, with simultaneous, previous or subsequent closing of further ones of said inlets and outlets out of which an exit of said mixture could take place and wherein a measurement is made whether said test pressure

Art Unit: 1746

reduces impermissibly as a function of time (column 4 lines 42-52). He discloses in column 3 lines 59-67 and column 4 lines 4-8, said fuel cell system comprising at least first and second inlets and at least first and second outlets as well as a plurality of valves (12, 16, 20, 24 and 44), at least one of which is associated with each inlet and outlet and able to be regulated to be switched on or off, there being lines communicating with said valves (10, 14, 18, 22 and 42), wherein a quantity of said mixture is fed into said fuel cell system, said quantity is measured, and said valves are switched on or off in accordance with at least a predetermined pattern and a predetermined sequence, a measurement is made of a quantity of said mixture merging from at least some of said lines, a sum is formed of said emerging quantities and is compared with said fed-in quantity to determine any leakages, which appear as a difference value. Bette also discloses in column 5 lines 3-8, a development in time of said difference value is compared with said predetermined pattern in order to associate any eventually present leakage with a leakage source or a plurality of leakage sources.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6-9 and 18-21 and 30-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bette (US 6,156,447).

Bette discloses the method of identifying a gas leak between the anode and cathode gas areas of a fuel cell system, but does not disclose expressly the method in which at least one of the tests is carried out as a long term test, including a plurality of switching on or switching off processes of said valves, and also including a plurality of heating up and cooling down cycles of said fuel cell system. He does not disclose the test being carried out during or after the manufacture of a vehicle incorporating the fuel cell system, the test being carried out in a workshop after repair of a vehicle, being carried out on a test bed during development of the fuel cell system and the system being present as a module and the tests being carried out during or after the manufacture of said module prior to installation into the vehicle. Bette also does not disclose the method wherein after a successfully concluded test a renewed test is carried out.

With respect to Claims 18-21, it would have been obvious to a person of ordinary skill in the art to perform these method steps as long term tests so as to be able to monitor, measure and evaluate the severity of the leakage, identify small leaks which may not show up during one test run and/or to narrow down the specific cell in which leakage is occurring.

With respect to Claims 6-9, it would have been obvious to a person of ordinary skill in the art to perform these method steps in any order since it can be held that the selection in which the process steps are carried out has little patentable weight when not distinctly claimed (MPEP 2144).

With respect to Claims 30-32, as is best understood by "renewed test", it would have been obvious to one of ordinary skill in the art to perform the tests again with a different



Art Unit: 1746

amount of gas mixture being fed into the fuel cell system to determine a different power yield of the system.

Claims 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bette (US 6,156,447) in view of Tomimatsu et al. (US 5,595,832).

Bette discloses the method of identifying a gas leak between the anode and cathode gas areas of a fuel cell system, but does not disclose expressly wherein said fuel cell system is heated to one of an operating temperature and an excess temperature prior to and during the carrying out of any one of said tests.

Tomimatsu et al. discloses, the fuel cell being heated to an operating temperature (column 8 lines 55-56) and under a high temperature (column 11 line 16) prior to testing for a gas-crossleak amount at the exhaust output of the cathode (column 22 lines 20-30).

Bette and Tomimatsu et al. are analogous art because they are from the same field of endeavor, fuel cells. At the time of the invention it would have been obvious to one of ordinary skill in the art to heat the fuel cell of Bette to an operating temperature and a higher temperature prior to and during the carrying out of any of the tests as in the Tomimatsu et al. reference for the purpose of making sure that the fuel cell operates at a maximum temperature and is fully functional before a test is performed for leakage.

Claims 22-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bette (US 6,156,447) in view of Bailey et al. (US 5,763,113).

Bette discloses the method of identifying a gas leak between the anode and cathode gas areas of a fuel cell system, but does not disclose expressly wherein an association is

Art Unit: 1746

developed between an electrical power generated by said fuel cell system when supplying a predetermined quantity when supplying a predetermined quantity of said mixture to said fuel cell system and an actual power yield of another fuel cell system of the same kind when supplying an actual quantity of fuel in operation at at least one preset operating point, with a check being made whether said electrical power generated during said supply of said predetermined quantity of said mixture corresponds to an expected power yield for said predetermined quantity of said mixture, from which a conclusion is drawn whether, in operation, with supply of said actual quantity of fuel, said actual power yield can be expected at said at least one preset operating point.

As Claims 22-25 are best understood by the examiner, Bailey et al. discloses in column 9 lines 5-15, the voltage across at least one of the fuel cells in the stack is measured. Absent a reactant transfer leak, the fuel cells in the stack will generate a constant voltage dependant upon the concentration of reactants in the fuel cell and the load, in any connected to the fuel cell. A reactant transfer leak will introduce oxidant and result in a mixed potential at the anode, which may result in a measurable drop in cell voltage that can be detected by the voltmeter. The cell voltage of a given cell is compared to the cell voltages of other cells in the stack or a reference cell voltage. If the measured cell voltage is significantly less than the comparison cell voltage, then a reactant transfer leak is indicated.

Bette and Bailey et al. are analogous art because they are from the same field of endeavor, fuel cells. At the time of the invention it would have been obvious to one of ordinary skill in the art to compare the voltage output of the fuel cell system of Bette with a separate fully functioning fuel cell system as in the Bailey et al. reference for the purpose of comparison and detection of leakage within the fuel cell system.

Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bette (US 6,156,447) in view of Meltser et al. (US 5,763,113).

Bette discloses the method of identifying a gas leak between the anode and cathode gas areas of a fuel cell system, but does not disclose expressly wherein at least one of a fuel sensor and an inert gas sensor is used in order to determine any leakages of said mixture.

Meltser et al. discloses in column 4 lines 49-52, as part of the hydrogen leakage alert system, a hydrogen sensor communicates with the cathode exhaust gas manifold for measuring hydrogen concentration therein.

Bette and Meltser et al. are analogous art because they are from the same field of endeavor, fuel cells. At the time of the invention it would have been obvious to one of ordinary skill in the art to use a hydrogen sensor as in the Meltser et al. reference as part of the fuel cell system of Bette to monitor the amount of hydrogen seepage through the membrane into the cathode flow channel so as to catch the problem of leakage before it causes inefficiency in the fuel cell operation (Meltser et al. column 4 lines 33-38).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karie O'Neill whose telephone number is (571) 272-8614. The examiner can normally be reached on Monday through Friday from 8am to 5pm.

Art Unit: 1746

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on (571) 272-1414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KAO

MICHAEL BARR  
SUPERVISORY PATENT EXAMINER

A handwritten signature in black ink, appearing to read 'Michael Barr', with a long horizontal line extending from the end of the signature.